REMARKS

Claims 1-18 are currently pending in the application.

Claim 13 has been amended to correct the antecedent basis for the solid oxide fuel cell system.

The Office Action divided claims 1-18 into two groups: Group I, claims 1-6, drawn to catalytic partial oxidation processors; and Group II, claims 7-18, drawn to methods for the catalytic partial oxidation of hydrocarbon fuels. Applicants confirm the provisional election, with traverse, to prosecute Group II, claims 7-18. Applicants submit that the restriction requirement is improper and should be withdrawn because both groups of claims could be searched together without an undue burden. Nonetheless, claims 1-6 have been canceled without prejudice, as being drawn to non-elected inventions.

Reconsideration of the present application and allowance of the pending claims are respectfully requested in view of the following remarks.

Non-obviousness

The Office Action has rejected claims 7-18 under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 6,221,280 to Anumakonda et al. (hereinafter "Anumakonda") in view of U.S. Patent Publication No. 2002/0041986 to Wojtowicz et al. (hereinafter "Wojtowicz"), in further view of U.S. Patent No. 4,331,451 to Isogaya et al. (hereinafter "Isogaya"), and in further view of U.S. Patent Publication No. 2002/0114747 to Marchand et al. (hereinafter "Marchand"). The Office Action states that it would have been obvious to one of ordinary skill in the art, at the time of the Applicants' invention, to combine Anumakonda, Wojtowicz, and Isogaya to provide heat from an oxidation reaction to an inlet stream in order to prevent the deposition of carbon on a catalyst bed. In addition, the Office Action states that Marchand makes it obvious to one of ordinary

skill in the art, at the time of the Applicants' invention, to provide a closed vessel where at least one passage of a heat exchanger extends through a portion of the reaction chamber of Anumakonda in order to use the heat supplied by the exothermic oxidation for other parts of the reaction. The rejections are respectfully traversed in view of the following remarks.

Applicant's Claims

Claim 7, from which claims 8-12 depend, describes a method for catalytic partial oxidation of hydrocarbon fuel comprising feeding a feed gas into at least one catalytic partial oxidation reactor, reacting the feed gas to convert it to an exit gas mixture of hydrogen and carbon monoxide, and passing a heat exchange fluid past the catalytic partial oxidation reactor with the heat exchange fluid flowing in the same direction of reactant flow in the reactor such that heat from partial oxidation in the reactor transfers to the heat exchange fluid. Claim 13, from which claims 14-18 depend, describes a method for producing electric power which comprises steps similar to the steps of claim 7 and additionally comprises directing the exit gas to a solid oxide fuel cell system. By passing a heat exchange fluid past the catalytic partial oxidation reactor in the same direction of reactant flow, the reaction can be maintained near optimal reaction temperature and safety hazards resulting from the substantial heat produced by the reaction can be avoided.

The Cited References

Anumakonda discloses an apparatus for catalytic partial oxidation of hydrocarbons. The exterior wall of the catalytic partial oxidation reactor comprises radiation shields to contain heat within the reaction zone. Col. 10, lines 24-26. A furnace in the form of a cylindrical heating element may also be provided to create a desired reaction temperature and maintain adiabatic

conditions. Col. 10, lines 45-50. As admitted by the Examiner, Anumakonda does not teach a method comprising passing a heat exchange fluid past a catalytic partial oxidation reactor in the same direction of reactant flow such that heat from the reactor transfers to the heat exchange fluid.

Wojtowicz discloses a method for producing a hydrogen-rich gas from a hydrocarbonaceous material by (1) pyrolysis of the hydrocarbonaceous material to produce carbon-rich residue and hydrogen gas and (2) combusting a portion of the carbon-rich residue (i.e., char-combustion). Any carbon monoxide resulting from the char-combustion is converted to carbon dioxide, "with the heat of the *CO-to-CO_2 oxidation* transferred either to the diesel processor directly or to one of its inlet streams". Paragraph [0079] (emphasis added). In addition to failing to disclose or suggest transferring heat from a *partial oxidation reaction* to a heat exchange fluid, Wojtowicz expressly teaches away from using partial oxidation throughout its specification, taking the position that "partial oxidation produces relatively small amounts of gaseous hydrogen". Paragraph [0007] and see also paragraphs [0067]-[0070].

Isogaya discloses a process for catalytic gasification of heavy distillates at temperatures greater than 500°C to prevent carbon deposition. Isogaya also teaches that at "a *lower temperature*, carbon deposition is caused easily on the catalyst bed." Col. 5, lines 16-18. Clearly, Isogaya discloses a process which teaches away from transferring heat from a partial oxidation reactor to lower the reactor temperature.

Marchand discloses a steam reforming system comprising a steam reformer which converts a fuel into a reformate stream to be fed into a shift reactor. The shift reactor can be integrated with an absorbent bed to form an integrated reactor. Heat transfer passages extend

through the integrated reactor so that heat may be transferred from the shift reactor and the absorbent bed to a coolant. The coolant is used to affect lower temperature, which is advantageous for absorption equilibrium. Paragraphs [0156]-[0163]. Marchand does not disclose or suggest transferring heat from a partial oxidation reaction to a heat exchange fluid.

No Prima Facie Obviousness

According to M.P.E.P. §2142, three basic criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or modification, either in the references themselves or the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. The teaching or suggestion to make the claim combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicants' disclosure. *In re Vaeck*, 947 F.2d 488 20 U.S.P.Q. F.2d 1438 (Fed. Cir. 1991).

None of the three basic criteria of *prima facie* obviousness are met here and applicants respectfully submit that Anumakonda, Wojtowicz, Isogaya, and Marchand do not establish a *prima facie* case of obviousness against claims 7 and 13 of this application. First, there is no motivation to combine the teachings of Anumakonda, Wojtowicz, Isogaya, and Marchand because Anumakonda teaches maintaining heat within a catalytic partial oxidation reactor and thus teaches away from passing a heat exchange fluid past a catalytic partial oxidation reactor to *transfer heat from the reactor* to the heat exchange fluid. A prior art reference that teaches away from the claimed invention is a significant factor to be considered in determining obviousness

and does not establish a prima facie case of obviousness. M.P.E.P § 2145; M.P.E.P § 2143; *In re Fine*, 873 F.2d 1071, 5 USPQ 2d 1596 (Fed. Cir. 1988).

Anumakonda teaches maintaining the temperature within a catalytic partial oxidation reactor by using *radiation shields and a furnace.* Clearly, any combination of Anumankonda with Wojtowicz or Marchand, both of which teach transferring heat from different reactors to a coolant, is not suggested by the references. In addition, combination of Anumakonda, which discloses a partial oxidation process, with Wojtowicz would be improper since Wojtowicz expressly teaches that pyrolysis, not partial oxidation, should be used to produce hydrogen. Thus, there is no suggestion or motivation in the references to pass a heat exchange fluid past a catalytic partial oxidation reactor to *transfer heat from the reactor* to the heat exchange fluid, as described by the Applicants' claims.

Furthermore, there would have been no reasonable expectation of success to one of ordinary skill in the art at the time the invention was made in view of Anumakonda, which clearly teaches *heating and insulating* a catalytic partial oxidation reactor. Wojtowicz teaches *cooling* a CO-to-CO_2 reactor and Marchand teaches *cooling* a shift reactor. Since the teachings of Wojtowicz and Marchand are in direct contrast to Anumankonda's teachings, the skilled artisan would not reasonably expect that modification of Anumakonda to incorporate the teachings of Wojtowicz and Marchand would be successful. Thus, a *prima facie* case of obvious has <u>not</u> been established and the Applicants claims, which describe transferring heat from a partial oxidation reactor to the heat exchange fluid, are novel and nonobvious.

In view of the present response to Office Action, Applicant respectfully requests that a timely Notice of Allowance be issued in this case. If there are any issues which can be resolved by a telephone conference or an examiner's amendment, the Examiner is invited to telephone the attorney at (404) 853-8064.

Respectfully submitted,

/Peter G. Pappas/

Peter G. Pappas
Reg. No. 33,205

SUTHERLAND ASBILL & BRENNAN LLP
999 Peachtree Street, NE
Atlanta, Georgia 30309-3996
Telephone: (404) 853-8000
Facsimile: (404) 853-8806